Christ Church Grammar School

2021
TEST 4

MATHEMATICS METHODS Year 11

Section Two:
Calculator-assumed

Your name Solutions

Teacher's name _____

Time and marks available for this section

Working time for this section:	15 minutes
Marks available:	14 marks

Materials required/recommended for this section

To be provided by the supervisor

This Question/Answer Booklet
Formula Sheet (retained from Section One)

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: drawing instruments, templates, and up to three calculators approved for use in this assessment

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Instructions to candidates

1. The rules of conduct of the CCGS assessments are detailed in the Reporting and Assessment Policy. Sitting this assessment implies that you agree to abide by these rules.

2. Write your answers in this Question/Answer Booklet using a blue/black pen. Do not use erasable or gel pens.

3. Answer all questions.

4. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.

5. Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

6. **Show all your working clearly**. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.

7. It is recommended that **you do not use pencil**, except in diagrams.

See next page

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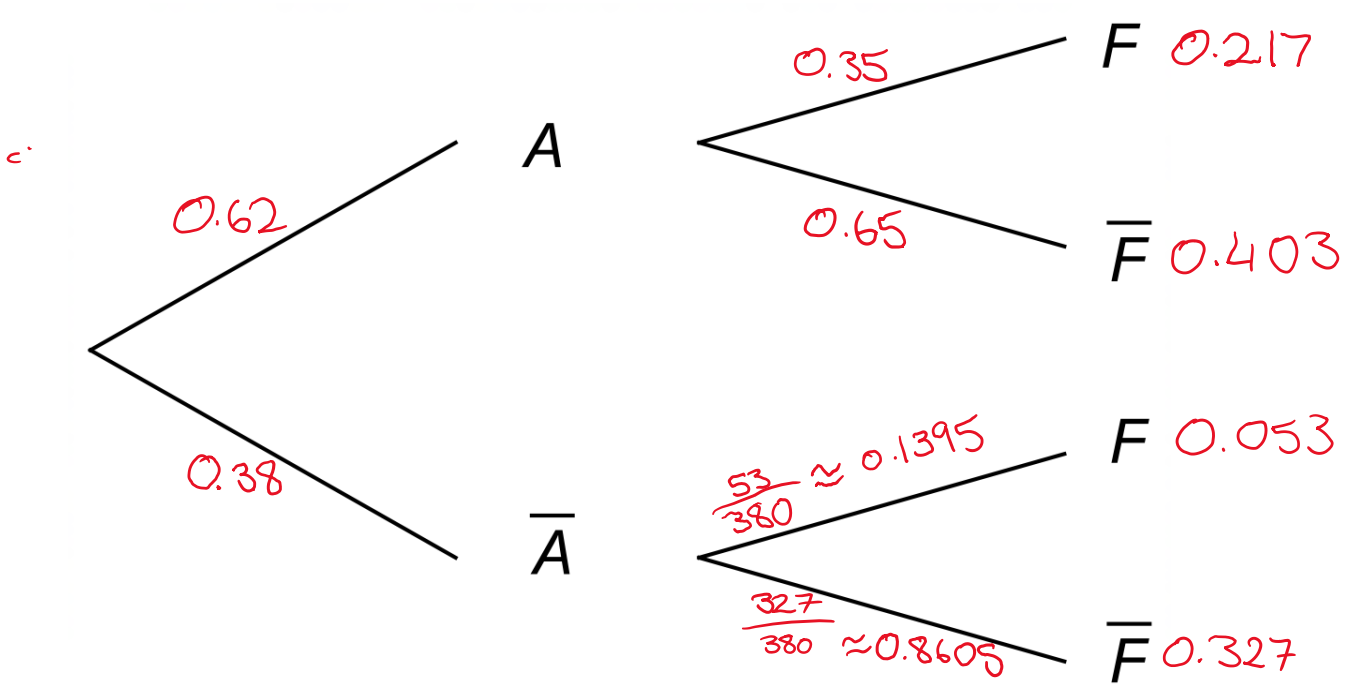
See next page

Question 6 **(8 marks)**

A manufacturer produces steel components on two different machines. Records indicate that:

- 62% of components are produced by Machine A.
- 35% of components produced by Machine A are deemed faulty.
- 27% of all components are deemed faulty.

(a) Use this information to complete the probabilities on each branch of the tree diagram below. (4 marks)



$0.217 + x = 0.27$

$x = 0.053$

$0.38 \times y = 0.053$

$y = 0.1395$

✓ A, $\bar{A}$ correct

✓ F & $\bar{F}$ given A correct.

✓ F & $\bar{F}$ given $\bar{A}$ correct

✓ final values

Question 6 continued

(b) If a component is randomly selected, determine the probability that it was

(i) manufactured on Machine A **and** is faulty. (1 mark)

0.217

✓Correct Value

(ii) manufactured on Machine A **or** is faulty. (1 mark)

$0.217 + 0.403 + 0.053$

$= 0.673$

✓Correct sum.

(c) Given that a faulty component is selected, determine the probability that this component was manufactured on Machine A. (2 marks)

$$\frac{0.217}{0.217+0.053} = \frac{0.217}{0.27}$$

$= 0.8037$

✓Correct denominator

✓Simplifies.

– allow FT from tree diagram

Question 7 **(6 marks)**

A farmer measured the initial area of a lupin crop infested by cowpea aphids as 230 m^2. One week later the area infested by the aphids had increased exponentially.

(a) If the daily growth rate was found to be 4.9%, write a formula for A, the area of the lupin crop infested by cowpea aphids measured in square meters, in terms of t, the number of days since the initial infestation was recorded. (1 marks)

$A = 230(1.049)^t$

✓ Correct equation

(b) If no measures were taken to control the spread of cowpea aphids, on which day will more than 1000 m^2 of the crop be infested. (2 marks)

$\text{solve}(1000 = 230(1.049)^t)$

$t = 30.72$

∴ On the 31st day

✓ equation to solve.

✓ Correct Day.

Must give 2 marks if only day is shown.

See next page

Question 7 continued

(c) After 5 weeks the farmer decides to take action. They decide to use an insecticide which will reduce the population of the aphids by 7% each day.

(i) Determine the equation for population, P, in terms of t, the number of days since the insecticide was applied. (2 marks)

$P = 1227.07(0.93)^t$ ✓Calculates new initial value.

Or $P = P_0(0.93)^t$ ✓Correct rate

(ii) On which day, since the insecticide was introduced, will the population of aphids reduce to just 25 aphids. (1 mark)

Solve $(25 = 1227.07(0.93)^t)$

$t = 53.7$

On the 54th day. ✓Correct day.

OR solve $(25 = P_0(0.93)^t)$

End of questions

Additional working space

Question number: _____

Additional working space

Question number: _____